

HIDDEN/INTERNAL FRAME RECEIVER STYLE HITCH
WITH EXTERNAL MOUNT POINTS

RELATED APPLICATIONS

5 This application claims benefit of priority to provisional application serial number 60/398,302 filed July 24, 2002, and is a continuation-in-part of application serial number 09/637,806 filed August 11, 2000, as well as a continuation-in-part of application serial number 09/767,891 filed January 22, 2001, all of which are incorporated herein by reference.

10 **FIELD OF THE INVENTION**

The present invention relates to an assembly for a trailer hitch for motorcycles that allows for easy attachment of the hitch and an unobtrusive profile. The invention addresses both the hitch assembly on the motorcycle and the potential height disparity between the ball and the trailer tongue.

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BACKGROUND OF THE INVENTION

Motorcycle enthusiasts are concerned about maintaining the clean lines and classic form of their vehicles. Motorcyclists take pleasure in the freedom and exhilaration that riding the highways brings. Trailers are occasionally needed or wanted 20 to carry extra gear, such as for traveling or camping. Towing a trailer with a motorcycle is well known. However, to enable the attachment of a trailer, a hitch must be mounted to the motorcycle. Unfortunately, such hitches detract from the flowing lines and sleek impression of the motorcycle.

Prior methods for attaching hitch assemblies to a motorcycle have generally 25 been to secure such hitches to the frame, rear struts, rear hub, or other substantial support locations, or to a combination of these locations, by an exterior tube frame with bolts and nuts. The mounting process often requires significant disassembly of components or removal of the rear wheel. This is a major undertaking and, thus, once such hitches are installed, they are not easily removed and become de facto permanent 30 extensions to rear wheel and fender assemblies. As the majority of time a motorcycle is used it is not pulling a trailer, the unused hitches become unsightly, undesirable

accessories.

These hitches, which are quite prominent and highly visible, generally extend rearward from the attachment points on the motorcycle around the rear wheel and/or fender in a yoke-like form. They are even more unsightly and incongruous with bob tail
5 or short fender motorcycles. Common hitches extend significantly beyond and below the fender. For low fender configurations, hitches must wrap around the fender to reach supportive attachment points and are therefore very obvious and unsightly as well.

SUMMARY OF THE INVENTION

10 The object of the present invention is to provide a trailer hitch for a motorcycle which does not detract from the aesthetics of the fender and rear end of the motorcycle. In one embodiment, the attachment points for the trailer hitch are located inside and underneath the rear fender. This allows the hitch assembly to be nested under and inside the rear portion of the fender as well and thus it is not readily visible. In other
15 configurations, such as with fat tires where there is little extra room under the fender, the attachment points may be on the outside of the rear fender, however the hitch is designed to follow the contours of and blend with the fender.

Specifically in one embodiment the hitch assembly attaches to the frame horn of the motorcycle as it rises up over the rear wheel. The hitch assembly is compatible with
20 multiple fender styles such as conventional, bob tail, or a low retro style. A further embodiment encompasses a hitch frame that fits inside the fender and is attached to the bike at supports used to retain and mount saddlebags onto a bike, the hitch assembly may be designed to accommodate saddlebags and turn signals as well. Notably, the hitch assembly does not attach to or require support from the wheel or hub.

25 In the case of a motorcycle with a short or "bobtail" fender with any embodiment of the hitch frame, the connection of the hitch to the tongue of a trailer may be assisted through the use of a goose neck extension. The goose neck extension allows for proper attachment between the trailer and the motorcycle at the ball hitch or other hitching mechanism point by keeping the trailer tongue at the proper height such that
30 the trailer maintains a level orientation. In other types of fenders, the assembly places the ball hitch at the right height.

In an alternate embodiment of an under the fender hitch, the ball hitch or other

appearance of a trailer hitch assembly as it is hidden under the fender. In this version, the ball hitch is removably attached to the trailer hitch assembly by a pin and lock pin assembly. When not in use, the ball hitch is removed, leaving only the original fender visible.

5 A major improvement of the subject invention is the ease with which the hitch assembly is mounted to the bike, without major effort and the ability to leave the hitch frame installed, while mounting locations and brackets are concealed when the saddlebags are installed in the saddlebag embodiment. The hitch ball can be removed when not needed.

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BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a bobtail-fender motorcycle fitted with a substantially hidden trailer hitch assembly capable of accommodating turn signals of the motorcycle;

Figure 2 is a perspective view of one trailer hitch assembly;

15 Figure 3 is a midsectional top view of the motorcycle with the trailer hitch assembly installed inside of the fender;

Figure 4 is a midsectional side view of the motorcycle with the trailer hitch assembly installed inside of the fender;

Figure 5 is a perspective view of another trailer hitch assembly;

20 Figure 6 is a perspective view of a gooseneck extension piece for use in towing a motorcycle trailer;

Figure 7 shows a trailer hitch assembly installed on a motorcycle having a low-retro-style fender;

Figure 8 is a perspective view of another trailer hitch assembly;

25 Figure 9 is a perspective view of another trailer hitch assembly that may be installed on motorcycle saddlebag brackets;

Figure 10 is a top cut away view of Figure 9 showing a hitch frame and hitch ball with the side plates;

Figure 11 is a side view of the hitch frame and hitch ball with the side plates;

30 Figure 12 is a rear assembly view of the trailer hitch assembly also shown in Fig. 11; and

Figure 13 is rear view of a trailer hitch assembly installed on saddlebag support

brackets.

DETAILED DESCRIPTION OF THE INVENTION

- The rear fender 26 of a motorcycle 27, as shown for example in Figure 1, is generally mounted to both the two fender struts 30 and the frame horn 28. The frame horn 28 is a conventional frame horn and is that part of the motorcycle frame which extends behind the seat and up and over the rear wheel 25. As the frame horn 28 rises, it splits like a yoke with two members spaced apart across the width of the rear wheel 25. The fender 26 is normally mounted on the interior of the frame horn 28, between these yoke members of the frame horn 28, and the fender struts 30 are mounted on the exterior of the frame horn 28, one on each side of the motorcycle 27. The fender struts 30 can be chrome-plated pieces which cover the structural steel of the frame horn 28. The fender 26 and the fender struts 30 are bolted to the frame horn 28 by bolts running through all three, sandwiching them together.
- The frame horn 28 does not extend all the way to the end of the fender 26 or back of the wheel 25. The fender struts 30 and fender 26 are generally attached to the frame horn 28 by several bolts closer to the seat. The fender 26 and fender struts 30 may be further connected by additional bolts where these parts extend beyond the tip of the frame horn 28. If saddlebags are installed (not shown), there is usually a saddlebag support framework on the outside of the fender which attaches to the fender struts/frame. This framework runs vertical along the outside of the rear fender behind the wheel, and is attached to the frame above the rear tire and a horizontal support frame that runs under the saddlebags and attaches to the frame of the motorcycle just in front of the rear wheel. This saddlebag support structure supports the saddlebags and carries the weight of the bags and their contents while holding the saddlebags in a fixed position.

- A trailer hitch assembly or frame 10 may be coupled with motorcycle 27 where it resides in a substantially or completely concealed position within fender 26. Frame 10 attaches to the normal frame horn 28/fender 26/fender strut 30 assembly. In one embodiment, the trailer hitch assembly 10 is attached to the frame horn 28 at least one point. The frame horn 28 provides the primary support for the towing capacity of the trailer hitch assembly 10. The hitch assembly 10 may be attached to the frame horn 28

with the same bolts or other common fasteners used to attach the fender 26 and fender struts 30.

Figure 2 shows a first embodiment of trailer hitch assembly or frame 10, and Figure 1 shows frame 10 in practical application on motorcycle 27. The motorcycle trailer hitch assembly 10 is comprised of two (2) substantially parallel side ribs 12 for attaching to the frame horn 28 and fender struts 30 of the motorcycle. At the rear most part of the hitch assembly 10 is a hitch base 16 to which a ball hitch 18 or other hitching mechanism is installed to mate with the tow bar attachment 11 of trailer T. The hitch assembly 10 may be made from structural steel or other suitable material that is able to 10 withstand the vibration and weight bearing of the towing of motorcycle trailers.

The hitch base 16 may be an extension of the side ribs 12, and thus of unitary construction, or of separate construction incorporating a cross piece welded to each side rib 12 or attached by any suitable means such as rivets, removable pins, bolts or screws. Figure 2 shows additional support for the hitch base 16 in the form of welded 15 corner supports 14.

The hitch assembly 10 of this first embodiment may be dimensioned for mounting either underneath the fender 26 or on the outside of the fender 26 on top of the fender strut 30. Figure 1 shows a side view of the rear of a motorcycle incorporating an under the fender 26 hitch assembly 10. Figure 3 shows a top view taken along line 20 3-3' of Fig. 1, with the top of the fender 26 and fender strut 30 cut away to expose the frame horn 28, the side rib 12, the fender 26 and the fender strut 30. In the depicted configuration, the fender strut 30 on one side of the motorcycle is connected to the frame horn 28 and the fender 26 by six standard bolts, e.g., bolt 13. The hitch assembly 10 is, for example, attached by utilizing two or three of the five bolts per side 25 that are already present on the motorcycle when frame 10 is attached as a retrofit device.

The hitch assembly 10 of Figure 2 includes a forward notch 20 for each side rib 12 which fits around and engages the corresponding bolt shaft at the frame bolt position 32 as in Figure 4. This bolt is already used to attach the fender 26 and fender strut 30 30 to the frame horn 28 at the frame bolt position 32. This same attachment would occur on the opposite side of the motorcycle with the second side rib 12. The forward notch 20 is formed such as to slip around the bolt at the frame bolt position 32 into a space

between the head of the bolt and the underside of the fender 26 for an internal mount, or between the fender strut 30 and the nut on the bolt in an external application, when the bolt is loosened. It is intended that the bolt need not be entirely removed, but merely that the forward notch 20 be slipped into the spacing created when the bolt is

5 loosened.

The top notch 22 in each of the side ribs 12 is similarly attached either underneath the fender 26 or on top of the fender strut 30 depending on preference at tail light position 34 sliding top notch 22 into a similar spacing, created when the bolts at tail light positions 34 are loosened. This is again done without the necessity of

10 removing the bolts. The top notches 22 may be wide enough as in Figure 1 to accommodate in a fender strut 30 mounting, in addition to the bolts, side turn signal supports and their wiring that are sometimes installed at tail light position 34. For motorcycles without side turn signals in tail light position 34, the top notches 22 may be more narrow to merely fit around the bolts as in Figure 4.

15 Fig. 4 is taken along line 4-4' of Fig. 3. In some configurations for side turn signals, the side turn signal supports may fully invoke the use of the bolts at tail light position 34. In this case, the rear-most bolt connecting the fender 26 and fender strut 30 at strut bolt position 36 should be used to support the hitch assembly 10. For this purpose, there is a rear hole 24 within in each side rib 12, aligned with strut bolt position

20 36 for attachment at that point. Ideally, in all installations of the hitch assembly 10, the rear hole 24 will be bolted to the fender 26 and fender strut 30 for added support. A hole rather than a notch is used in the hitch assembly 10 at the strut bolt position 36 to provide added stability to the mounting system of the hitch assembly 10. Although this may require the entire removal of a bolt, this is not a major undertaking because the bolt

25 at the strut bolt position 36 is easily accessible at the end of the fender 26 and the frame horn 28 does not extend this far.

On some motorcycles, the fender strut 30 may not extend the full length of the fender 26 and therefore the hitch assembly 10 may be merely attached to the fender 26 at strut bolt position 36. This attachment to the fender 26 may be accomplished with

30 suitable common attachment means, including bolts with lock nuts or other anti-loosening means.

As noted, the first embodiment of the hitch assembly 10 can be mounted on the

inside of the fender 26 as in Figure 2 or on the outside of the fender strut 30. When the side ribs 12 are mounted inside the fender 26, other than the hitch base 16 and the ball hitch 18, no portion of the hitch assembly 10 is readily visible (See Fig. 1). When the side ribs 12 are mounted on the fender strut 30 they may be made to match the width,
5 color and form of the fender strut 30 so as to easily blend with the natural look and lines of the motorcycle.

The second embodiment 39 of the hitch assembly 10, as shown in Figure 5 incorporates a removable hitch base 38. This embodiment would generally be used in an inside the fender 26 configuration on motorcycles with conventional or low retro-style
10 fenders 26 (see Fig. 7). When not in use, the hitch base 38 can be easily removed and the hitch assembly 10 would not be readily viewable as it is substantially hidden under the fender 26 as seen in Figure 5. The removable hitch base 38 is not limited, however, to longer fenders, and may also be used in conjunction with a gooseneck extension when a hitch is installed on short bobtail fenders of the type in Figures 5 and 1.

15 For low retro-style or long conventional fenders 26 as in Fig. 7, the side ribs 12 of the hitch assembly 10, Fig. 8, are longer than shown in the first embodiment of Figure 2, with the rear portion extending and curving downward further behind the rear wheel to reach to the lowest point of the tail of the fender 26. For low retro-style fenders, the side ribs 12 must be longer and extend even further as in Figures 7 and 8.

20 To accommodate a removable hitch base, the hitch assembly incorporates a vertical hitch plate 42 instead of a horizontal hitch base 16. The hitch plate 42 may be an extension of the side ribs 12, and thus of unitary construction, or of separate construction incorporating a cross-piece welded to each side rib 12 or attached by any suitable means such as rivets, removable pins, bolts or screws. As shown in Fig. 5, the
25 vertical hitch plate 42 meets the side ribs 12 at a common downward most point 41. Mounted on the hitch plate 42 is a hitch plate mount 44, which in the preferred embodiment is of square channel steel construction well known in the industry. One side of the square channel hitch plate mount 44 is attached to the hitch plate 42 in a vertical orientation.

30 A ball 43 couples with hitch base 38 for towing purposes. A hitch base mount 40 of square channel steel construction is affixed to hitch base 38 and may be received for coupling with square channel 42. One end of the hitch base mount 40 is attached to

the removable hitch base 38 such that the square channel of the hitch base mount 40 rises in a vertical orientation. The hitch plate mount 44 and the hitch base mount 40 may be attached to the hitch plate 42 and removable hitch base 38, respectively, via conventional means, such as with bolts, pins 46 or other fasteners, or if permanency is 5 desired, via riveting, welding or other assembly.

The square channel of the hitch base mount 40 is of slightly shorter perimeter such that it may easily slide into the square channel 44 of the hitch plate mount. The removable hitch base 38 can then be securely connected to the hitch plate via one or more bolts, pins 46 or other similar attachment means. When the removable ball mount 10 38 is attached as shown in Figure 5, it extends down below the tail of the fender, Figures 1 and 7, and is available for attachment to the ball socket on the tongue of the trailer, Figures 1 and 7. When not in use, removal of the removable hitch base 38 results in the remainder of the hitch assembly being hidden from view under the fender 26.

15 In installations on bobtail fender 26 motorcycles such as in Figures 2 and 3, the ball hitch 18 may be significantly higher than the ball socket on the tongue of the trailer. Generally, the trailer tongue should be kept level with the ground to maintain a good connection between the ball hitch 18 and the ball socket and prevent the rear of the trailer from scraping the ground. In order to attach the tongue of the trailer to the ball 20 hitch 18 and maintain a strong connection and freedom of turning and movement, an extension piece 48 such as in Figure 6 may be needed.

In a preferred embodiment, a gooseneck extension piece 48, as shown on Figure 6, is of square channel steel construction. The lower end 52 connects to the tongue. The upper end 50 then attaches to the ball socket for normal connection with the ball 25 hitch 18. Attachment means between the lower end 52 and the tongue of the trailer are conventional such as with bolts, pins 46 or other fasteners, or if permanency is desired, via riveting, welding or other assembly. The angle of incline θ of the gooseneck extension 48 is an acute angle, preferably between 30 and 60 degrees (30° - 60°), and the length and height may vary depending on the particular combination of motorcycle 30 and trailer. Fig. 8 shows a third embodiment 45 where a ball plate 47 is welded to the vertically rising hitch plate 42.

Another embodiment 60 of a hitch attachment apparatus or frame 10 is shown in

Figure 9. Embodiment 60 is suited for motorcycles with saddlebag support brackets 61, with or without the saddlebags (not shown). Embodiment 60 is readily fitted or removed from the motorcycle due to the easy access to the mounting hardware, as explained in more detail below.

5 As illustrated in Figure 10 saddlebag support brackets 61, when installed on motorcycles, normally attach on the outside of the fender 26 to support and retain the saddlebags in a fixed location. The saddlebag support brackets 61 are attached to the motorcycle frame by various means, such as by bolts or rivets. This embodiment 60 uses saddlebag support brackets to mount a hitch assembly 62 onto saddlebag support
10 brackets 61, e.g., via bolt 63, rather than directly using the motorcycle frame for attachment and support.

Fig. 11 is a side view of the hitch assembly 62 including a side pieces 103 and detachable hitch 66. Fig. 12 is an assembly view of the hitch assembly 62.

As shown in Figure 12 the hitch frame 101 of the hitch assembly 62 is comprised
15 of two side pieces 103 that are nearly vertical and parallel to one another. Side pieces that fit just inside the inside walls of the rear fender and extend forward to attach to two side plates 102 on each side of the fender. The side pieces 103 of the hitch frame 101 are thin plate steel or other suitable stiff, durable material that can support the vertical and horizontal load on the hitch assembly 62 and still be thin enough so as not to
20 interfere with the rear wheel W.

The side pieces 103 extend rearward to a cross support 104, which may be cross-supported by cross-support 105, all connecting the two side pieces 103. In the illustrated embodiment, the cross-support 105 extends along the back surface 114, the hitch frame 101 is additionally stiffened by bottom corner plates 15. The hitch sleeve
25 106 is similar to hitch sleeve 44 and in the same manner receives channel 107 for retention by pin 108. Hitch sleeve 106 is retained on the hitch frame 101 by welding, or other suitable attachment. Cross support 105 may, for example, be replaced by other stiffeners and is not the only way this can perform the support of the hitch sleeve 106 and attach to the side pieces 103. Other suitable arrangements are readily understood.

30 In order to attach the hitch frame 101 to the saddlebag support frame 61, side plates 102 are used, one on each side. By attaching the side plates 102 to the outside of the saddlebag supports 61 (see Fig. 9) and attaching of the forward portion 109 of

- the hitch frame 101 to the side plates 102, e.g., using screws, bolts or other suitable means (not shown), the hitch frame 101 is thus supported by the saddlebag supports 61 and is thus usable. The areas 111, 112 form sleeves that sandwich the saddlebag support frame and/or fender 26 for purposes of mounting hitch frame 101 to motorcycle 27, as shown in Fig. 13. The hitch frame 101 may be dimensioned to reside inside fender 26 for concealment, or outside of fender 26. A hitch ball 110 is attached to the channel 107 for use in a receiver tube and pin configuration, though the channel 107 may not be observable as it may be at or inside the bottom edge of the rear fender when the hitch frame 102 is installed.
- Alternatively, the side pieces 102, 103 may be a single piece capable of being affixed to saddlebag support brackets 61, for example, as a uniform side piece belt made from a piece of material or welding a permanent attachment to the side pieces. Similarly, hitch frame 101 may be constructed from a unitary piece of sheet like material that is bent, formed or molded into the appropriate shape with or without the hitch sleeve 106 as part of the unitary construction.
- The benefits to this embodiment 62 are the easy attachment and/or removal using saddlebag support brackets or attachment points available on the outside portion of the motorcycle while concealing the hitch frame inside the rear fender out of view.